METRIC
MIL-STD-2411-2
26 AUGUST 1994

MILITARY STANDARD

INTEGRATION OF
RASTER PRODUCT FORMAT FILES
INTO THE
NATIONAL IMAGERY TRANSMISSION FORMAT

AMSC N/A **AREA MCGT**

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

FOREWORD

DEPARTMENT OF DEFENSE

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Director, Defense Mapping Agency, ATTN: TI, ST A-10, 8613 Lee Highway, Fairfax, VA 22031-2137 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

CONTENTS

This page intentionally blank

1. SCOPE

1.1 Scope.

a. The Raster Product Format (RPF) is a standard data structure for geospatial databases composed of rectangular arrays of pixel values (e.g. in digitized maps or images) in compressed or uncompressed form. RPF is intended to enable application software to use the data in RPF format on computer-readable interchange media directly without further manipulations or transformation, as defined in MIL-STD-2411.b. The National Imagery Transmission Format Standard (NITFS) is a collection of related standards and specifications developed to provide a foundation for interoperability in the dissemination of imagery and imagery-related products among different computer systems, as defined in MIL-STD-2500 and MIL-HDBK-1300. c. To facilitate interoperability among users of RPF data, this standard specifies requirements for the integration of RPF files into NITF for recording on computer-readable media or for dissemination via digital communication lines.

1.2 Purpose. This standard is intended to provide a common interchange format for users of RPF data and of NITF data.

1.3 Application. The Military Departments, Office of the Secretary of Defense, Organizations of the Joint Chiefs of Staff, and the Defense Agencies of the Department of Defense (collectively known as DoD components) shall use the information in this standard in preparing and accessing digital geographic data required or specified to be in the integrated RPF/NITFS format.

1.4 Security. This standard is UNCLASSIFIED. The procedures and processes presented herein may be used for classified processing where appropriate security provisions are added.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the current Department of Defense Index of Specifications and Standards (DODISS) and the supplement thereto, cited in the solicitation (see 6.2).

MIL-HDBK-1300	National Imagery Transmission Format Standard
MIL-STD-2411 MIL-HDBK-1300	Defense Mapping Agency Military Standard, Raster Product Format
MIL-STD-2500	National Imagery Transmission Format for the National Imagery Transmission Format Standard

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094).

2.1.2 Other Government documents, drawings, and publications. This section is not applicable to this standard.

2.2 Non-Government publications. This section is not applicable to this standard.

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications or specification sheets) the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

This section is not applicable to this standard.

4. GENERAL REQUIREMENTSa. The integration of RPF into NITF shall enable RPF users to meet all of the requirements of MIL-STD-2411.

b. The integration of RPF into NITF shall enable NITF users with appropriate software to receive and interpret RPF data in accordance with MIL-STD-2500.

4.1 Notation.

a. The notation used herein for numbers, file structures, and other items shall be in accordance with MIL-STD 2411, section 4.3. Four additional data types are used in this specification. These are as follows:

Data Type	Abbreviation (used in defining data structures)
Alphabetic string (ASCII character subset)	alph
Alphanumeric string (ASCII character subset)	alnm
Unsigned number (ASCII character subset)	numr
Signed number (ASCII character subset)	snum

b. Appendix 10 contains a mapping of the NITF file and field names given herein (i.e. those beginning with the prefix [nitf ... or <nitf ...) into those assigned in MIL-STD-2500.

c. Most of the names assigned herein to rpf groups (i.e. those beginning with the prefix [rpf ...) correspond exactly to those assigned to those groups in MIL-STD-2411. For example, the [rpf location section] group cited herein corresponds exactly to the [location section] group specified in MIL-STD-2411. The names that are not found in MIL-STD-2411 (e.g. [rpf sections and components] are generic names that are used herein only.

4.2 General Approach to Integration. The [rpf file]s employ a very generalized logical structure that affords the implementor great flexibility in determining the physical arrangement of data within NITF. Consequently, only a few simple rules shall apply:

a. Every [rpf file] shall have an [rpf header section] and an [rpf location section], and other sections and components that depend on the file type, as defined in MIL-STD-2411.

b. The [rpf header section] shall be recorded in a tagged [nitf user-defined header data] (UDHD) segment of the [nitf file]. The [rpf header section] shall identify the physical location of the [rpf location section].

c. The physical locations of the remaining components of the [rpf file] shall be specified in the [rpf location section], so these components may be recorded anywhere in the [nitf file], consistent with the rules for formatting [nitf file]s. Receiving RPF-compatible system software shall be required to use the information in the [rpf location section] to determine the locations of the remaining components of the [rpf file] for processing.

d. Except for certain designated components, all components of the [rpf file] shall be recorded in user-defined registered data segments of the [nitf file]. Certain designated components in the [rpf frame file] will be recorded in the [nitf image data] area, to enable access by NITF users who do not have the capability to interpret [rpf file]s.

e. Each [rpf file] component shall be recorded in an [nitf file] as a contiguous stream of bytes that can always be processed as a single "atomic" (i.e. indivisible) unit.

5. DETAILED REQUIREMENTS 5.1 RPF Files. The RPF encompasses the following file types:

a. Table of contents files delineating the identities and contents of [rpf frame file]s and [rpf external color/grayscale file]s that may be stored on a given interchange volume (or transmitted in a single message stream). An overview of the [rpf table of contents file] structure is as follows:

```
[rpf table of contents file]
     {1}
     [rpf header section]
     [rpf location section]
     [rpf boundary rectangle section] (0, 1)
     [rpf frame file index section] (0, 1)
     [rpf color table index section] (0, 1)
```

b. Frame files containing raster map and image data in compressed or uncompressed form that may be recorded on an interchange volume (or transmitted in a message). An overview of the [rpf frame file] structure is as follows:

```
[rpf frame file]
     {1}
     [rpf header section]
     [rpf location section]
     [rpf coverage section] (0, 1)
     [rpf compression section] (0, 1)
     [rpf color/grayscale section] (0, 1)
     [rpf image section]
          {2}
          [rpf mask subsection] (0, 1)
          [rpf image description sub-header]
          [rpf image display parameters sub-header]
          [rpf spatial data subsection]
     {1}
     [rpf attribute section] (0, 1)
     [rpf related images section] (0, 1)
     [rpf replace/update section] (0, 1)
```

c. External color/grayscale files containing color tables and histograms that are too large to store (or transmit) efficiently in a [rpf frame file], where they would otherwise be normally recorded (or transmitted). An overview of the [rpf external color/grayscale file] structure is as follows:

```
[rpf external color/grayscale file]
     {1}
     [rpf header section]
     [rpf location section]
     [rpf color/grayscale section
```

5.2 NITF Messages. The [nitf file] encompasses a single file type. An overview of the [nitf file] structure is as follows:

```
[nitf file]
  {1}
  [nitf message header]
       {2}
       [nitf identification and origination group]
       [nitf security group]
       [nitf image description group]
       [nitf symbol description group]
       [nitf label description group]
       [nitf text description group]
       [nitf data extension segment description group]
       [nitf reserved segment description group]
       [nitf user-defined header group]
       [nitf extended header group]
  {1}
  [nitf image] (0, ... many)
       {2}
       [nitf image sub-header]
       [nitf image data]
  {1}
  [nitf symbol] (0, ... many)
  [nitf label] (0, ... many)
  [nitf text] (0, ... many)
  [nitf data extension segment] (0, ... many)
       {2}
       [nitf data extension sub-header]
       [nitf datea extension segment data]
  {1}
  [nitf reserved segment] (0, ... many)
```

5.3 NITF/RPF Integration. A given RPF file shall be integrated into an [nitf file] by incorporating RPF file components into the following segments of the [nitf file]:

a. [nitf user-defined header group];

b. [nitf image]; and

c. [nitf data extension segment].

5.3.1 Integration in the [nitf user-defined header group]. The integrated structure shall be as follows:

```
{2}
[nitf user-defined header group]
    {3}
    <nitf user-defined header length>,numr:5
    [nitf user-defined header data]
        {4}
        <nitf user-defined header overflow>,numr:3
        [rpf user-defined data group]
        {5}
            <nitf user-defined data group tag for
              rpf>,alph:6
            <nitf user-defined data group length for
              rpf>,numr:5
            [rpf header section]
            [rpf component] (0, ...many)
```

5.3.2 Integration in [nitf image]. The integrated structure shall be as follows:

```
{1}
[nitf image] (0, ... many)
    {2}
    [nitf image sub-header]
        {3}
        [nitf image sub-header data fields]
        [nitf user-defined sub-header group]
            {4}
            <nitf user-defined image data length>,numr:5
            <nitf user-defined image data overflow>,numr:3
            [nitf tagged data subgroup for rpf]
                {5}
                <nitf tag>,alph:6
                <nitf udid tagged data subgroup for rpf
              length>,numr:5
                [rpf color/grayscale section] (0, 1)
                [rpf image description sub-header]
                [rpf component] (0, ... many)
        {3}
        [nitf extended image sub-header group]
    {2}
    [nitf-rpf image data]
        {3}
        <nitf blocked image data offset>,uint:4 (0, 1)
        [rpf mask subsection] (0, 1)
        [rpf image display parameter sub-header] (0, 1)
        [rpf compression section] (0, 1)
        [rpf spatial data subsection]
```

5.3.3 Integration in [nitf data extension segment]. The integrated structure shall be as follows:

```
    {1}
    [nitf-rpf data extension segment] (0, 1)
        {2}
        [nitf data extension sub-header]
            {3}
            [nitf identification and security group]
            <nitf user-defined data extension sub-header length>,numr:4
            [nitf user-defined data extension sub-header] (0, 1)
(omitted in rpf frame files)
            [nitf user-defined data extension group]
                    {5}
                    [nitf tagged data subgroup for rpf]
                        {6}
                        <nitf tag>,alph:6
                        <nitf tagged data subgroup length>,numr:5
                        [rpf component] (1, ... many)
```

6. NOTES
(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. This standard is intended to govern the integration of files written in RPF into the NITF message format, for use in DoD missions.

6.2 Acquisition requirements. When this specification is used in acquisition, the applicable issue of the DODISS must be cited in the solicitation (see 2.1.1 and 2.2).

6.3 International standardization agreements. This section is not applicable to this standard.

6.3.1 International Standardization Agreements (STANAGs). This section is not applicable to this standard.

6.3.2 Quadripartite Standardization Agreements (QSTAGs). This section is not applicable to this standard.

6.3.3 Air Standardization Coordinating Committee Agreements (ASCC). This section is not applicable to this standard.

6.3.4 International MC&G Agreements. This section is not applicable to this standard.

6.3.5 Executive Orders. This section is not applicable to this standard.

6.3.6 InterAgency Agreements. This section is not applicable to this standard.

6.3.7 Other Documentation. This section is not applicable to this standard.

6.4 Subject term (key word) listing.

Data interchange formats
Geospatial databases
Image data structures
Map data structures
Mapping, charting, and geodesy
National Imagery Transmission Format
Raster Product Format

APPENDIX

MAPPING OF GROUP AND FIELD NAMES BETWEEN MIL-STD-2411-2 AND MIL-STD-2500

10. GENERAL

10.1 Scope. This appendix lists the cross-reference of Raster Product Format group and field names as described in this standard and the National Imagery Transmission Format as described in MIL-STD-2500 and MIL-HDBK-1300. This information is intended for reference and for ensuring that names that may be assigned in future versions of this standard do not duplicate existing names.

20. APPLICABLE DOCUMENTS

This section is not applicable to this standard.

30. GROUP OR FIELD NAMES

Group or field name given herein	**Mnemonic field names in MIL-STD-2500**
<nitf data item overflowed>	DESITEM
<nitf length of user-defined data extension group>	DESSHL
<nitf overflowed header type>	DESOFLW
<nitf tag>	RETAG
<nitf tagged data subgroup length>	REL
<nitf udid tagged data subgroup for rpf length>	UDIDL
<nitf user-defined data group length for rpf>	REL
<nitf user-defined data group tag for rpf>	RETAG
<nitf user-defined header length>	UDHDL
<nitf user-defined header overflow>	UDOFL

<nitf user-defined image data length>	UDIDL
<nitf user-defined image data overflow>	UDOFL

Group or field name given herein	**Mnemonic field names in MIL-STD-2500**
[nitf data extension segment]	All fields in MIL-STD-2500, TABLE XVII
[nitf data extension segment data]	DESDATA
[nitf data extension segment description group]	NUMDES LDSHnnn LDnnn
[nitf data extension sub-header]	DE DESTAG DESVER DESSG DESOFLW DESITEM DESSHL DESSHF
[nitf extended header group]	XHDL XHD
[nitf extended image sub-header group]	IXSHDL IXSOFL IXSHD
[nitf identification and origination group]	FHDR CLEVEL STYPE OSTAID FDT FTITLE
[nitf identification and security group]	DE DESTAG DESVER DESSG
[nitf image]	(none)
[nitf-rpf image data]	(none)

Group or field name given herein	**Mnemonic field names in MIL-STD-2500**
[nitf image description group]	FL HL NUMI LISHnnn LInnn
[nitf image sub-header]	All fields in MIL-STD-2500, TABLE III
[nitf image sub-header data fields]	All fields in MIL-STD-2500, TABLE III except UDIDL, UDOFL, UDID, IXSHDL, IXSODL, IXSHD
[nitf label]	All fields in MIL-STD-2500, TABLE XI
[nitf label description group]	NUML LLSHnnn LLnnn
[nitf file]	(none)
[nitf message header]	All fields in MIL-STD-2500, TABLE XI
[nitf non-rpf data group]	RETAG REL REDATA
[nitf non-rpf image data group]	RETAG REL UDID
[nitf reserved segment]	(none)

[nitf reserved segment description group]	NUMRES LRSHnnn LRnnn

Group or field name given herein	**Mnemonic field names in MIL-STD-2500**
[nitf security group]	FSCLAS FSCODE FSCTLH FSREL FSCAUT FSCTLN FSDWNG FSDEVT FSCOP FSCPYS ENCRYP ONAME OPHONE
[nitf symbol]	All fields in MIL-STD-2500, TABLE VI
[nitf symbol description group]	NUMS LSSHnnn LSnnn
[nitf tagged data subgroup for rpf]	RETAG REL UDID
[nitf text]	All fields in MIL-STD-2500, TABLE XIII
[nitf text description group]	NUMT LTSHnnn LTnnn
[nitf user-defined data extension group]	DESDATA
[nitf user-defined data extension sub-header]	DESOFLW DESITEM DESSHL DESSHF DESDATA

Group or field name given herein	**Mnemonic field names in MIL-STD-2500**
[nitf user-defined header data]	UDHD
[nitf user-defined header group]	UDHDL UDHD
[nitf user-defined sub-header group]	UDIDL UDOFL UDID

INDEX

MIL-STD-2411
CONCLUDING MATERIAL

Custodian:
DMA - MP

Preparing activity:
DMA - MP

Agent: AFMC

Review activities:
Air Force - 09
Army - PO
Navy - NO, MC

(Project MCGT-0140)